



General Certificate of Secondary Education
November 2023

Centre Number

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Candidate Number

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Mathematics

Unit M7 Paper 2
(With calculator)
Higher Tier



[GMC72]

GMC72

THURSDAY 23 NOVEMBER, 10.45 am – 12 NOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page, on blank pages or tracing paper.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all sixteen** questions.

All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on page 2.

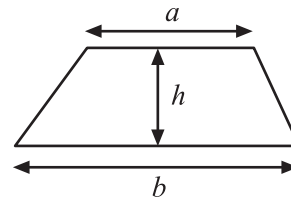


Formula Sheet

Volume of prism = area of cross section \times length

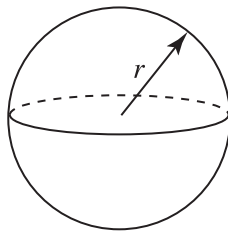


Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

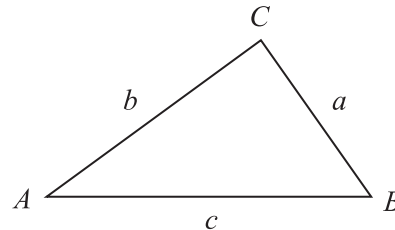


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



1 Here are some numbers.

| | | |
|----|----|----|
| 12 | 8 | 29 |
| 18 | 30 | 46 |
| 49 | 2 | 21 |

From the numbers given, write down

(a) the square number,

Answer _____ [1]

(b) the cube number,

Answer _____ [1]

(c) the triangular number.

Answer _____ [1]

[Turn over





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It takes 2 days to paint the outside of 6 houses.

(a) How long would it take to paint the outside of 15 houses?

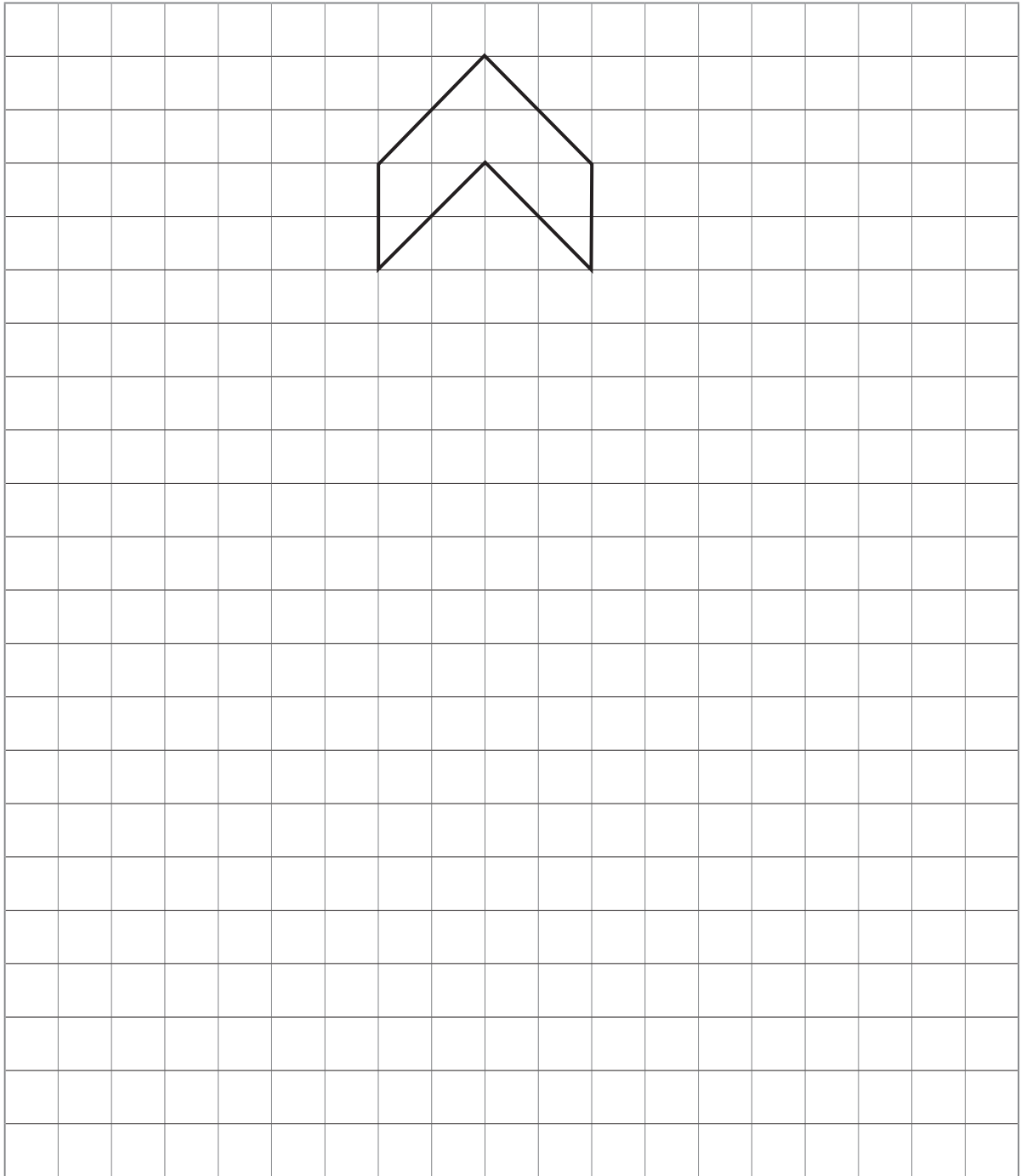
Answer _____ days [2]

(b) State one assumption you made in answering part (a).

Answer _____
_____ [1]



3 Enlarge the shape on the grid below using a **scale factor of 3**



[3]

[Turn over



4 Conor mixes red, blue and yellow paint in the ratio 4 : 2 : 1

He uses 10 litres of blue paint.

He sells the mixed paint at a price of £18.25 per litre.

Work out the total price of the mixed paint.

Answer £ _____ [3]





© Getty Images

A firm holds a Christmas raffle for its 20 employees.

The raffle tickets are numbered from 1 to 20

A ticket is drawn at random from a hat.

What is the probability that the ticket drawn is

(a) a number less than 10,

Answer _____ [1]

(b) a number more than 14,

Answer _____ [1]

(c) a prime number?

Answer _____ [1]

[Turn over



6 Julie collects 50p coins.

70 of these coins weigh 560 g.

What is the **value** of 880 g of these coins?

Answer £ _____ [3]



7 Ben and Orla share the cost of a meal in the ratio 3 : 1

The meal costs £64

Ben then pays the taxi fare.

Ben pays a total of £60

How much is the taxi fare?

Answer £_____ [3]



- 8 Data is recorded about the age and treatment received by patients who visit a dentist on a Monday.

| | Patients aged 30 or under | Patients aged over 30 |
|------------|---------------------------|-----------------------|
| Filling | 9 | 6 |
| Extraction | 5 | 13 |

- (a) What is the probability that one of these patients selected at random is over 30 and has an extraction?

Answer _____ [1]

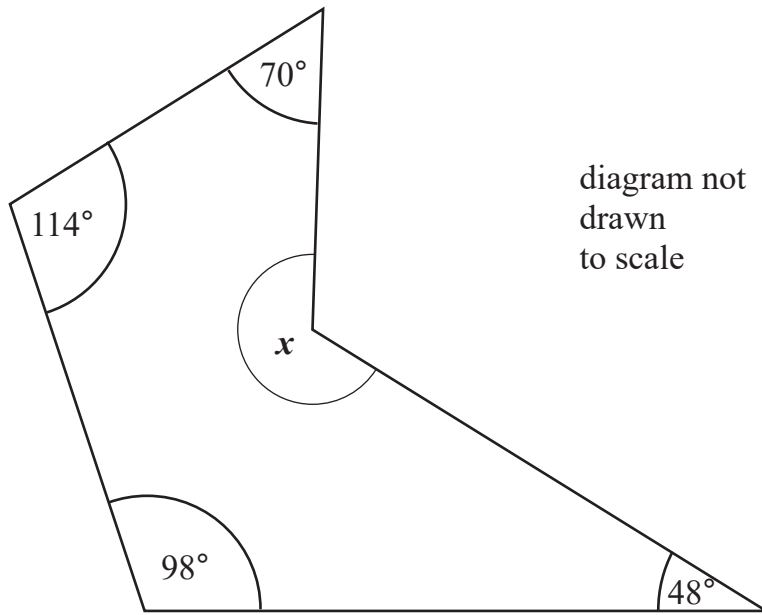
- (b) One of the patients aged 30 or under is selected at random.

What is the probability that this patient has a filling?

Answer _____ [1]



9 A sketch of an irregular pentagon is shown.



Calculate the value of x .

Show all your working.

Answer _____ ° [3]

[Turn over



10 Simplify $(x^5)^3$

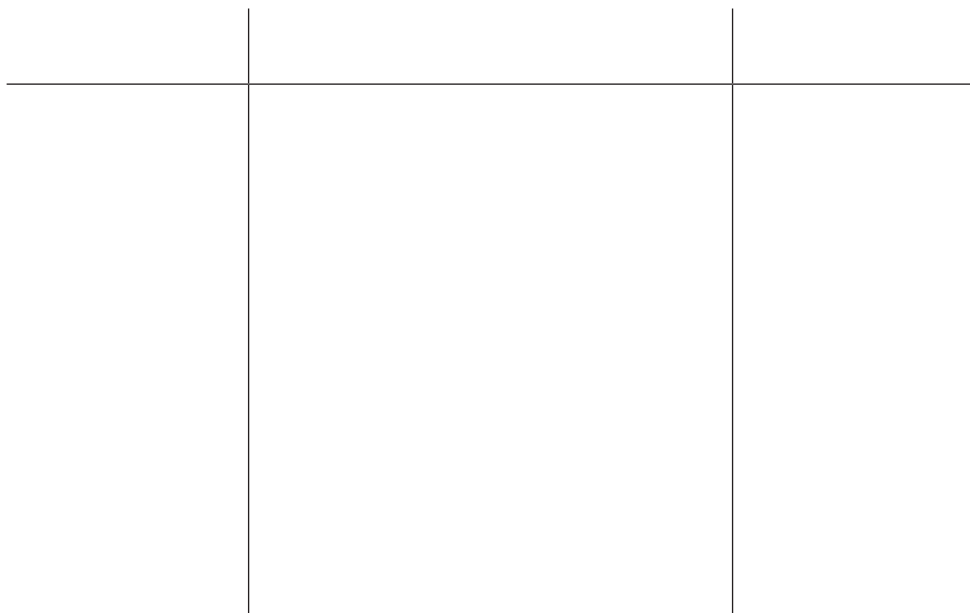
Answer _____ [1]

11 Use trial and improvement to find a solution of the equation

$$x^2 + \frac{x}{2} = 15$$

Give your answer correct to 1 decimal place.

You must show all your working.

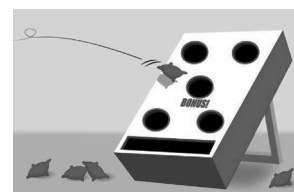


Answer $x =$ _____ [4]



12 Kate plays the game “throw the bean bag”.

She records the number of times she gets the bean bag in the bonus hole.



| | | | | |
|--|----|----|-----|-----|
| Total number of throws | 10 | 30 | 100 | 200 |
| Total number of times in the bonus hole | 2 | 8 | 49 | 104 |

- (a) Write down the best estimate of the probability that Kate gets the bean bag in the bonus hole if she continues throwing.

Give a reason for your answer.

Answer _____

because _____

_____ [2]

- (b) Kate continues with her game and throws it a total of 300 times.

Calculate the number of times you would expect her to get the bean bag in the bonus hole.

Answer _____ [2]

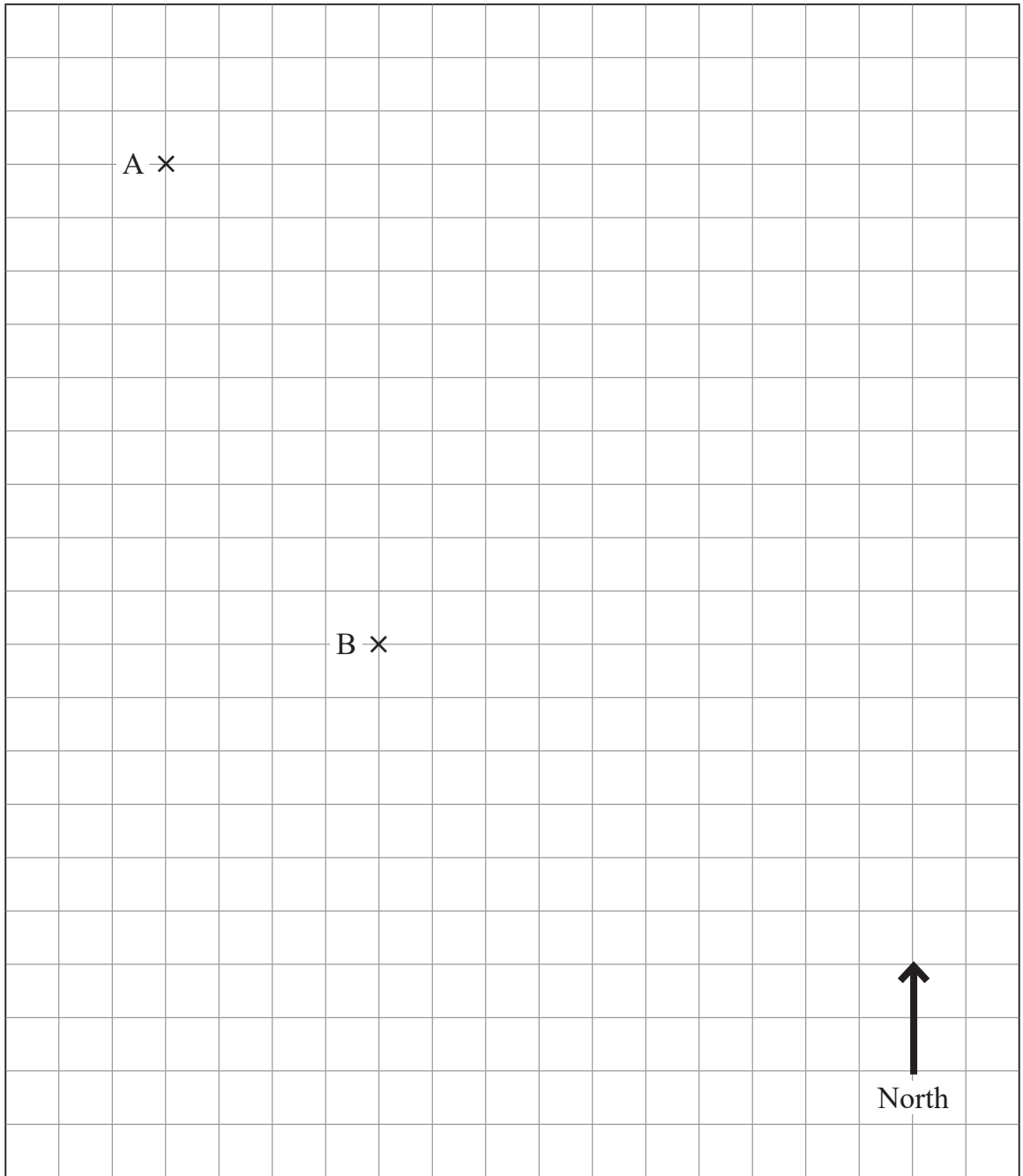
[Turn over



13 The position of two Airport Control Towers, A and B, are shown.

(a) What is the bearing of B from A?

Answer _____ ° [1]



(b) The two towers pick up a distress signal from a plane.

The bearing of the plane from A is 110°

The bearing of the plane from B is 050°

Find and mark the position of the plane with a P on the diagram.

[2]

[Turn over



14 Pete orders cold meals and hot meals on Monday, Tuesday and Wednesday.

On Monday he got 16 cold meals and 3 hot meals.

He paid £74

On Tuesday he got 20 cold meals and 7 hot meals.

He paid £112

On Wednesday he got 10 cold meals and 8 hot meals.

Work out what Pete paid for the meals on Wednesday.

A solution by trial and improvement will not be accepted.

Answer £ _____ [6]



15 Rearrange to make z the subject of

$$x = \sqrt{yz}$$

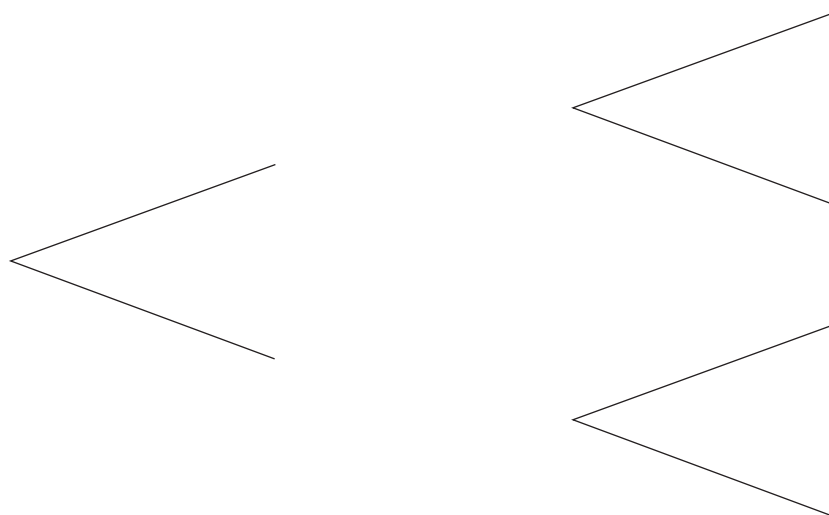
Answer _____ [2]



16 The probability that the first person to cross a footbridge in the morning is a child is 0.05

The probability that the first vehicle to pass under the footbridge is a tractor is 0.12

(a) Complete the tree diagram to show this information.



[3]

(b) What is the probability that the first person to cross is a child and the first vehicle to pass under is **not** a tractor.

Answer _____ [1]





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| Question Number | Marks |
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| 2 | |
| 3 | |
| 4 | |
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| Total Marks | |
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Examiner Number

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